

Notice of Allowability

Application No.

10/723,673

Examiner

Khai M. Nguyen

Applicant(s)

WOLMAN ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 1/9/2006.
2. ☒ The allowed claim(s) is/are 2,4,5,7 and 22-24.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☒ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


GEORGE ENG

SUPERVISORY PATENT EXAMINER

DETAILED ACTION

Allowable Subject Matter

1. Claims 2, 4-5, 7, 22-24 are allowed.

The following is a statement of reason for the indication of allowance: As the applicant stated in the remark (pages 6-7) of the amendment filed on 1/9/2006.

Applicant's invention is drawn to provided whereby a first wireless node, equipped with multiple radio transceivers tuned to orthogonal channels, selects one of the transceivers, and thus one of the channels, for communication to a neighboring second wireless node. The first node discovers the neighbor and obtains information concerning its available network interfaces. In accordance with one aspect of the invention, the first node may additionally determine whether the neighbor is itself capable of performing the same channel selection method for communication to the first node. The first node then periodically makes an estimate of the quality of each channel available for communication to the neighbor. Based on the channel quality estimates, the first node selects one of the channels and uses that channel for communication to the neighbor for a period of time. The first node may perform the method with respect to each of its neighboring nodes. In accordance with one embodiment of the invention, the first node may make estimates of channel quality based on a smoothed round-trip latency measurement, and a wireless network node, equipped with multiple radios tuned to orthogonal channels, maintains a table for storing information pertaining to the selection of a channel for communication to a neighboring wireless network node based

on estimates of the quality of each channel available for communication to the neighboring node. There is a separate entry in the table for each neighboring node.

Applicant's independent claim 2, each recites, inter alia, in a wireless network comprising a plurality of nodes, a method for selecting, by a first node, a channel for communicating with a second node, the first node having at least two network interfaces with radios tuned to orthogonal channels as defined in the specification (***paragraph 0025-0059***), the method comprising: discovering network interfaces of the second node available for communicating with the first node; with respect to each available network interface of the second node, periodically making a channel quality estimate; and making a channel selection, wherein discovering available network interfaces comprises: broadcasting an address resolution protocol request; receiving on a first channel a first address resolution protocol response from the second node; recording medium access control address information contained in the first address resolution protocol response; initially selecting the first channel for communicating with the second node; and for each additional address resolution protocol response received from the second node, recording medium access control address information contained in the additional address resolution protocol response. These limitations, in conjunction with all limitation of the independent claims, have not been disclosed, taught, or made obvious over the prior art of record.

Applicant's independent claim 4, each recites, inter alia, in a wireless network comprising a plurality of nodes, a method for selecting, by a first node, a channel for communicating with a second node, the first node having at least two network interfaces

with radios tuned to orthogonal channels as defined in the specification (**paragraph 0025-0059**), the method comprising: discovering network interfaces of the second node available for communicating with the first node; with respect to each available network interface of the second node, periodically making a channel quality estimate; and making a channel selection, The method of claim 1 wherein discovering available network interfaces is in accordance with a protocol, and wherein discovering available network interfaces further comprises discovering whether the second node is capable of operating in accordance with the protocol; wherein discovering whether the second node is capable of operating in accordance with the protocol comprises: sending a channel select message along each known network interface of the second node; if a channel select acknowledgment response is received from each known network interface of the second node, classifying the second node as being capable of operating in accordance with the protocol; if no channel select acknowledgment response is received from a known network interface after expiration of a timeout period, and if a maximum number of unacknowledged retransmissions has not been exceeded, retransmitting a channel select message along the interface; and if a maximum number of unacknowledged retransmissions has been exceeded, classifying the second node as not being capable of operating in accordance with the protocol. These limitations, in conjunction with all limitation of the independent claims, have not been disclosed, taught, or made obvious over the prior art of record.

Applicant's independent claim 7, each recites, inter alia, in a wireless network comprising a plurality of nodes, a method for selecting, by a first node, a channel for

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communicating with a second node, the first node having at least two network interfaces with radios tuned to orthogonal channels as defined in the specification (**paragraph 0025-0059**), the method comprising: discovering network interfaces of the second node available for communicating with the first node; with respect to each available network interface of the second node, periodically making a channel quality estimate; and making a channel selection, wherein making a channel quality estimate comprises: sending a probe message along the network interface; receiving a response to the probe message from the second node; and calculating a round-trip latency time associated with sending the probe message and receiving the response, further comprising: computing a smoothed round-trip time (SRTT) value according to a formula: $SRTT = \alpha * RTT_{new} + (1 - \alpha) * SRTT_{old}$ wherein α is a parameter chosen with a range from 0 to 1, wherein RTT_{new} is a most recent round-trip latency time measurement, and wherein $SRTT_{old}$ is a previously-computed SRTT value. These limitations, in conjunction with all limitation of the independent claims, have not been disclosed, taught, or made obvious over the prior art of record.

Applicant's independent claim 22, each recites, inter alia, a computer-readable medium on which is stored a data structure for use by a first wireless network node in selecting a channel for transmitting data to a second wireless network node in accordance with a protocol as defined in the specification (**paragraph 0025-0059**), the data structure comprising: a data field for identifying the second node; a data field for indicating whether the second node is known to use the protocol; a data field for storing a physical address associated with each known network interface of the second node; a

data field for storing a channel quality estimate associated with each known network interface of the second node; a data field for identifying a current preferred channel for transmitting data to the second node; a data field for recording a most recent time at which a channel was selected; a data field for recording a most recent time at which a message was either sent to or received from the second node; and a data field for storing times associated with unacknowledged messages. These limitations, in conjunction with all limitation of the independent claims, have not been disclosed, taught, or made obvious over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Citation of Pertinent Prior Art

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Urquhart et al. (U.S.Pub-20040156339) discloses Antenna diversity.

Benveniste (U.S.Pub-20030174690) discloses wireless Lans and neighborhood capture.


Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khai M. Nguyen whose telephone number is 571.272.7923. The examiner can normally be reached on 8:00-5:00.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, George En can be reached on 571.272.7495. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Khai Nguyen
AU: 2687

3/12/2006


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SUPERVISORY PATENT EXAMINER